CLAIMS

What is claimed is:

1. A spread-spectrum receiver comprising:
a high-rate path to receive multi-rate channels; and
a low-rate path to receive fixed-rate channels.

2. The receiver of claim 1 wherein the receiver is a wideband code division multiple access (WCDMA) receiver and the high-rate path despreads spread-spectrum multi-rate physical channels having a variable spreading factor and the low-rate path despreads fixed-rate spread-spectrum physical channels having a fixed spreading factor.

3. The receiver of claim 1 wherein the high-rate path comprises at least one high-rate rake finger to despread spread-spectrum signals comprising the multi-rate channels, each multi-rate channel having a different spreading code allowing for the substantially simultaneous reception of several multi-rate channels.

4. The receiver of claim 3 wherein the at least one high-rate rake finger comprises:
a set of correlators, each correlator to despread one multi-rate channel of the several received multi-rate channels with a corresponding spreading code;
a framer to separate control symbols and data symbols for each of the despread multi-rate channels; and
a buffer for each multi-rate channel to store the control and data symbols for the corresponding multi-rate channel.

5. The receiver of claim 4 wherein the at least one high-rate rake finger further comprises a code generator to generate the corresponding spreading codes for despreading each of the several multi-rate channels.

6. The receiver of claim 5 wherein the at least one high-rate rake finger further comprises:

a pilot channel correlator to despread a pilot channel having a predetermined spreading factor; and

a pilot channel buffer to store symbols from the despread pilot channel received from the pilot channel correlator,

and wherein the code generator also generates a spreading code for despreading by the pilot channel correlator.

7. The receiver of claim 1 wherein the multi-rate channels have a spreading factor ranging approximately from 4 to 256, and the fixed-rate channels has a spreading factor of approximately 256.

8. The receiver of claim 7 wherein the multi-rate channels have a bit-rate ranging approximately from 30 – 960 kbps, and the fixed-rate channels have a bit-rate of approximately 30 kbps.

9. The receiver of claim 3 wherein the high-rate path further comprises a high-rate rake to read symbols from the at least one high-rate rake finger and to multiply the symbols by a channel estimation.

10. The receiver of claim 9 wherein the high-rate rake is comprised of at least one finger engine to multiply the symbols with the channel estimation, and a combiner to combine multipath components of the multi-rate channels.

11. The receiver of claim 9 wherein the at least one high-rate rake finger is one of a plurality of high-rate rake fingers, each high-rate rake finger to despread a multipath component of each multi-rate channel, and

wherein the at least one finger engine is one of a plurality of finger engines, each finger engine to multiply the channel estimation with the symbols from a corresponding high-rate rake finger for each of the several multi-rate channels, and

wherein the combiner coherently combines symbols from the multipath components from the finger engines for the several multi-rate channels.

12. The receiver of claim 9 wherein the at least one high-rate rake finger and the high-rate rake are implemented with hardware elements, and wherein the low-rate path comprises:

at least one low-rate finger to despread a multipath component of spread-spectrum signals comprising the fixed-rate channels; and

a digital signal processor (DSP) to generate a channel estimation and to coherently combine symbols from the at least one low-rate finger with the channel estimation.

13. The receiver of claim 12 wherein the DSP assigns the at least one high-rate finger a multi-path component of the several multi-rate channels and the at least one low-rate finger a multi-path component of the fixed-rate channels.

14. The receiver of claim 13 wherein the at least one high-rate rake finger is one of a plurality of high-rate rake fingers, each high-rate rake finger to despread a multipath component of each multi-rate channel, and wherein the DSP performs frequency and time tracking to synchronize the high-rate fingers.

15. The receiver of claim 14 further comprising an interpolator to receive baseband samples from an analog front end and raise a sampling rate of the baseband samples to provide the baseband samples with an increased sampling rate to the high-rate path and the low-rate path for use by the rake fingers.

16. The receiver of claim 2 wherein the high-rate and low-rate paths are part of a low-level portion of the receiver which despreads and decodes the physical channels, and wherein the receiver further comprises a high-level portion to map the physical channels to transport channels.

17. A method for receiving spread-spectrum signals comprising:

despreading multi-rate channels in high-rate path; and

despreading fixed-rate channels in a low-rate path.

18. The method of claim 17 wherein at least one high-rate rake finger despreads spread-spectrum signals comprising the multi-rate channels, wherein each multi-rate channel has a different spreading code allowing for the substantially simultaneous reception of several multi-rate channels.

19. The method of claim 18 wherein the despreading the multi-rate channels comprises:

despreading one multi-rate channel of the several received multi-rate channels with a corresponding spreading code;

separating control symbols and data symbols for each of the despread multi-rate channels; and

buffering the control and data symbols for each multi-rate channel.

20. The method of claim 19 further comprising:

generating the corresponding spreading codes for despreading each of the several multi-rate channels; and

multiplying the data symbols with the channel estimation for each of a plurality of multipath components; and

combining multipath components of the multi-rate channels.

21. The method of claim 17 wherein the multi-rate channels have a spreading factor ranging approximately from 4 to 256, and the fixed-rate channels has a spreading factor of approximately 256.

22. The method of claim 20 wherein despreading the multi-rate channels is performed by at least one high-rate rake finger implemented with hardware elements, and wherein despreading the fixed-rate channels is performed with at least one low-rate finger to despread a multipath component of spread-spectrum signals comprising the fixed-rate channels, and wherein a digital signal processor

(DSP) generates a channel estimation and coherently combines symbols from the at least one low-rate finger with the channel estimation.

23. The method of claim 22 further comprising assigning, by the DSP, the at least one high-rate finger a multi-path component of the several multi-rate channels, and the at least one low-rate finger a multi-path component of the fixed-rate channels.

24. A wideband code division multiple access (WCDMA) receiver to despread multi-rate spread-spectrum physical channels having a variable spreading factor and to despread fixed-rate spread-spectrum physical channels having a fixed spreading factor, the receiver comprising a high-rate path to receive the multi-rate channels and a low-rate path to receive the fixed-rate channels, the high-rate path comprises:

a plurality of high-rate rake fingers to despread a multi-path component of each multi-rate channel; and

a high-rate rake to read symbols from the high-rate rake fingers, to multiply the symbols by a channel estimation, and combine the multi-path components from each rake finger,

and the low-rate path comprises:

at least one low-rate finger to despread a multipath component of spread-spectrum signals comprising the fixed-rate channels; and

a digital signal processor (DSP) to generate a channel estimation and to coherently combine symbols from the at least one low-rate finger with the channel estimation.

25. The receiver of claim 24 wherein the high-rate rake fingers comprise:

a set of correlators, each correlator to despread one multi-rate channel of the several received multi-rate channels with a corresponding spreading code;

a framer to separate control symbols and data symbols for each of the despread multi-rate channels;

a buffer for each multi-rate channel to store the control and data symbols for the corresponding multi-rate channel; and

a code generator to generate the corresponding spreading codes for despreading each of the several multi-rate channels.

26. The receiver of claim 25 wherein each multi-rate channel has a different spreading code allowing for the substantially simultaneous reception of several multi-rate channels, and wherein the multi-rate channels have a spreading factor ranging approximately from 4 to 256, and the fixed-rate channels has a spreading factor of approximately 256.